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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/791,375 | WALCH, MARK A. | |
| | Examiner | Art Unit | |
| | EDWARD PARK | 2624 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *26-77* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *26-77* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/21/05, 3/1/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Specification*

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

### *Claim Rejections - 35 USC § 112*

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. **Claims 51-77** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim calls for the element, "foreign language". The phrase, "foreign language" deems the claim indefinite. What is meant by foreign language? If the user is versed in multiple languages then is the language foreign? Does foreign language imply a language that is vaguely familiar or altogether incomprehensible? If the user is a native speaker of the language but does not comprehend a majority of the words in the document is it concerned a foreign language? The scope of protection is unclear since foreign language relies on the user's depth of knowledge of multiple languages, and the claim is therefore indefinite. The examiner will interpret the claim limitation as reasonably broad as possible. The interpretation of the claim limitation is that there will be no weight given to the phrase foreign and therefore any language will suffice in meeting the claim limitation. Correction is required.

**Claim 27** is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim calls for the element, "language foreign to a user". The phrase, "language foreign" deems the claim indefinite. What is meant by language that is foreign? If the user is versed in multiple languages then is the language foreign? Does "language foreign" imply a language that is vaguely familiar or altogether incomprehensible? If the user is a native speaker of the language but does not comprehend a majority of the words in the document is it concerned a foreign language? The scope of protection is unclear since foreign language relies on the user's depth of knowledge of multiple languages, and the claim is therefore indefinite. The examiner will interpret the claim limitation as reasonably broad as possible. The interpretation of the claim limitation is that there will be no weight given to the phrase foreign and therefore any language will suffice in meeting the claim limitation. Correction is required.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. **Claims 26-30, 32, 33, 34, 41, 42, 43, 49, 50, 51, 54, 56, 57, 58, 59, 60, 67, 68, 69, 75, 76** are rejected under 35 U.S.C. 103(a) as being unpatentable over Andersen et al (US 7,240,062 B2) in view of Syeda-Mahmood (US 5,953,451).

Regarding **claim 26**, Andersen discloses an image recognition system for searching documents in a source language comprising:
an imaged document (see fig. 4, numeral 108, col. 3, lines 7-11; scanned document 108 also referred to herein as a document image), the imaged document being stored in a document database (see fig. 5, numeral 504, 514; memory/storage device); a source language library for storing source language search terms (see fig. 4, numeral 404, fig. 5, numeral 404, col. 5, lines 50-60; dictionary 404 or other word list stored in storage device 514). Andersen does not disclose an image graph constructor coupled to the document database and the source language library, the image graph constructor configured to, generate search term image graphs from the source language search terms, and generate a collection of image graphs representing the imaged document; an image graph database for storing the search term image graphs and the collection of image graphs generated by the image graph constructor; and a comparison module coupled to the image graph database, the comparison module configured to search the imaged documents by comparing the collection of image graphs with selected search term image graphs;
wherein if at least one image graph from the collection of image graphs matches the selected search term image graphs, the imaged document is flagged as containing a search term justifying further analysis of the document.

Syeda-Mahmood, in the same field of endeavor, teaches an image graph constructor coupled to the document database and the source language library (see fig. 3, numeral 3; fig. 4, numeral 7; col. 5, lines 1-44; curve group generator), the image graph constructor configured to, generate search term image graphs from the source language search terms (see fig. 4, numeral 7; col. 5, lines 1-67; generate connected components of dark regions constituting word segments as

well as curved from the boundaries of such connected regions, once the lines of text are determined grouping involves assembling all such word segments that are separated by a distance), and generate a collection of image graphs representing the imaged document (see fig. 3, numeral 3, col. 5, lines 1-67; generate connected components of dark regions constituting word segments as well as curved from the boundaries of such connected regions, once the lines of text are determined grouping involves assembling all such word segments that are separated by a distance); an image graph database for storing the search term image graphs and the collection of image graphs generated by the image graph constructor (see fig. 3, numeral 5, fig. 4, numeral 12, col. 6, lines 10-60; Image Hash Table to represent information in the position of features in curves in curve groups in a manner that helps locate a query handwritten word); and a comparison module coupled to the image graph database, the comparison module configured to search the imaged documents by comparing the collection of image graphs with selected search term image graphs; wherein if at least one image graph from the collection of image graphs matches the selected search term image graphs, the imaged document is flagged as containing a search term justifying further analysis of the document (see fig. 4, numeral 11, see col. 8, lines 1-26; using the pose parameter, all points on curves of the query word are projected into the document image at location where it is then verified if a point feature on each curve in the image lies within some neighborhood of the projected point, the ratio of matched projected points to the total number of point on all curves in the query word constitutes a verification score, the verification is said to succeed if this score is above a suitably chosen threshold).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Andersen reference to utilize a image graph constructor to compare for a

search term as suggested by Syeda-Mahmood, to enable a "fast method of localizing handwritten word patterns in handwritten documents without detail text segmentation", "greater ability to deal with handwriting variation", and "means for organizing documents in a database that enables fast search and retrieval" (see col. 3, lines 29-39).

Regarding **claim 27**, Andersen discloses any language foreign to a user of the system (see fig. 5, numeral 404, 102; dictionary and word index).

Regarding **claim 28**, Andersen discloses an electronic version of a physical source language document (see fig. 1, numeral 104, 106, 108, col. 2, lines 63-67, col. 3, lines 1-11; analog document 104 is scanned by a digital scanner and the output of the digital scanner 106 is a scanned document 108).

Regarding **claim 29**, Andersen discloses generation by scanning the physical source language document (see fig. 1, numeral 104, 106, 108, col. 2, lines 63-67, col. 3, lines 1-11; analog document 104 is scanned by a digital scanner and the output of the digital scanner 106 is a scanned document 108).

Regarding **claim 30**, Andersen discloses a collection of source language characters (see fig. 4, numeral 404; dictionary which represents a language in which words are indexed that consist of characters).

Regarding **claims 32, 33, 34**, Andersen discloses all elements as mentioned above in claim 26. Andersen does not disclose generating an image graph for each character contained in the source language library and configured to employ an image graph generation process and involving an image reduction process and a data storage process.

Syeda-Mahmood, in the same field of endeavor, teaches generating an image graph for each character contained in the source language library (see col. 5, lines 1-67; generate connected components of dark regions constituting word segments as well as curved from the boundaries of such connected regions) and configured to employ an image graph generation process (see fig. 3, numeral 3, see fig. 4, numeral 8, col. 5, lines 1-67; generate connected components of dark regions constituting word segments as well as curved from the boundaries of such connected regions, once the lines of text are determined grouping involves assembling all such word segments that are separated by a distance) and involving an image reduction process and a data storage process (see col. 6, lines 9-67).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Andersen reference to utilize a image graph constructor to generate an image graph and image reduction process as suggested by Syeda-Mahmood, to enable a "fast method of localizing handwritten word patterns in handwritten documents without detail text segmentation", "greater ability to deal with handwriting variation", and "means for organizing documents in a database that enables fast search and retrieval" (see col. 3, lines 29-39).

Regarding **claims 41, 42**, Andersen discloses all elements as mentioned above in claim 26. Andersen does not disclose transforming into a collection of image graph by the image graph generation process; producing a collection of image graphs.

Syeda-Mahmood, in the same field of endeavor, teaches transforming into a collection of image graph by the image graph generation process (see fig. 4, numeral 3); producing a collection of image graphs (see fig. 3, 5a).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Andersen reference to utilize transformation into image graphs as suggested by Syeda-Mahmood, to enable a "fast method of localizing handwritten word patterns in handwritten documents without detail text segmentation" and "means for organizing documents in a database that enables fast search and retrieval" (see col. 3, lines 29-39).

Regarding **claims 43, 49**, Andersen discloses all elements as mentioned above in claim 26. Andersen does not disclose configuring to execute a screening process and a searching process and employing a depth first search.

Syeda-Mahmood, in the same field of endeavor, teaches configuring to execute a screening process and a searching process (see col. 8, lines 1-26; recovering pose parameters by solving the set of linear equation for the matching basis points corresponding to significant hits and verification is executed and said to succeed if this score is above a suitable chosen threshold) and employing a depth first search (see col. 8, lines 1-26; if no matching basis points are verified, then the next most signification query curve group is tried until no more significant groups are left).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Andersen reference to utilize a screening, searching, and employing a depth first search as suggested by Syeda-Mahmood, to enable a "fast method of localizing handwritten word patterns in handwritten documents without detail text segmentation" and "means for organizing documents in a database that enables fast search and retrieval" (see col. 3, lines 29-39).

Regarding **claim 50**, Andersen discloses all elements as mentioned above in claim 43. Andersen does not disclose computing the number of connections between the nodes for each image graph in the collection of image graphs to the number of connection nodes in the search term image graph for at least first and second ones of the search term image graphs and link ratios for the first and second stored search term image graphs.

Syeda-Mahmood, in the same field of endeavor, teaches computing the number of connections between the nodes for each image graph in the collection of image graphs to the number of connection nodes in the search term image graph for at least first and second ones of the search term image graphs and link ratios for the first and second stored search term image graphs (see col. 8, lines 1-26).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Andersen reference to utilize connections between nodes as suggested by Syeda-Mahmood, to enable a "fast method of localizing handwritten word patterns in handwritten documents without detail text segmentation" and "means for organizing documents in a database that enables fast search and retrieval" (see col. 3, lines 29-39).

Regarding **claim 51**, Andersen discloses a method for identifying search terms in a foreign language document comprising:

establishing a foreign language lexicon, the foreign language lexicon including foreign language search terms and foreign language characters (see fig. 4, numeral 404, fig. 5, numeral 404, col. 5, lines 50-60; dictionary 404 or other word list stored in storage device 514); providing an imaged document in a foreign language (see fig. 4, numeral 108, col. 3, lines 7-11; scanned document 108 also referred to herein as a document image). Andersen does not disclose inputting the

foreign language search terms and the imaged document into an image graph constructor, the image graph constructor configured to generate search term image graphs and configured to generate a collection of image graphs representing the imaged documents; searching the imaged documents by comparing the collection of image graphs to selected search term image graphs; and flagging imaged documents when an image graph from the collection of image graphs matches the selected search term image graphs.

Syeda-Mahmood, in the same field of endeavor, teaches inputting the foreign language search terms and the imaged document into an image graph constructor (see fig. 3, numeral 3; fig. 4, numeral 7; col. 5, lines 1-44; curve group generator), the image graph constructor configured to generate search term image graphs (see fig. 4, numeral 7; col. 5, lines 1-67; generate connected components of dark regions constituting word segments as well as curved from the boundaries of such connected regions, once the lines of text are determined grouping involves assembling all such word segments that are separated by a distance) and configured to generate a collection of image graphs representing the imaged documents (see fig. 3, numeral 3, col. 5, lines 1-67; generate connected components of dark regions constituting word segments as well as curved from the boundaries of such connected regions, once the lines of text are determined grouping involves assembling all such word segments that are separated by a distance); searching the imaged documents by comparing the collection of image graphs to selected search term image graphs; and flagging imaged documents when an image graph from the collection of image graphs matches the selected search term image graphs (see fig. 4, numeral 11, see col. 8, lines 1-26; using the pose parameter, all points on curves of the query word are projected into the document image at location where it is then verified if a point feature

on each curve in the image lies within some neighborhood of the projected point, the ratio of matched projected points to the total number of point on all curves in the query word constitutes a verification score, the verification is said to succeed if this score is above a suitably chosen threshold).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Andersen reference to utilize a image graph constructor to compare for a search term as suggested by Syeda-Mahmood, to enable a "fast method of localizing handwritten word patterns in handwritten documents without detail text segmentation", "greater ability to deal with handwriting variation", and "means for organizing documents in a database that enables fast search and retrieval" (see col. 3, lines 29-39).

Regarding **claim 54**, Andersen discloses foreign language characters (see fig. 5, numeral 404, 102).

Regarding **claim 56**, Andersen discloses an electronic version of a physical foreign language document (see fig. 1, numeral 104, 106, 108, col. 2, lines 63-67, col. 3, lines 1-11; analog document 104 is scanned by a digital scanner and the output of the digital scanner 106 is a scanned document 108).

Regarding **claim 57**, Andersen discloses generation by scanning the physical source foreign language document (see fig. 1, numeral 104, 106, 108, col. 2, lines 63-67, col. 3, lines 1-11; analog document 104 is scanned by a digital scanner and the output of the digital scanner 106 is a scanned document 108).

Regarding **claims 58, 59, 60**, Andersen discloses all elements as mentioned above in claim 51. Andersen does not disclose generating an image graph for each character contained in

the foreign language lexicon and configuring to employ an image graph generation process and involving an image reduction process and data storage process.

Syeda-Mahmood, in the same field of endeavor, teaches generating an image graph for each character contained in the foreign language lexicon library (see col. 5, lines 1-67; generate connected components of dark regions constituting word segments as well as curved from the boundaries of such connected regions) and configuring to employ an image graph generation process (see fig. 3, numeral 3, see fig. 4, numeral 8, col. 5, lines 1-67; generate connected components of dark regions constituting word segments as well as curved from the boundaries of such connected regions, once the lines of text are determined grouping involves assembling all such word segments that are separated by a distance) and involving an image reduction process and data storage process (see col. 6, lines 9-67).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Andersen reference to utilize a image graph constructor to generate an image graph and image reduction process as suggested by Syeda-Mahmood, to enable a "fast method of localizing handwritten word patterns in handwritten documents without detail text segmentation", "greater ability to deal with handwriting variation", and "means for organizing documents in a database that enables fast search and retrieval" (see col. 3, lines 29-39).

Regarding **claims 67, 68, 75, 76**, Andersen discloses all elements as mentioned above in claim 51. Andersen does not disclose transforming into a collection of image graph by the image graph generation process; producing a collection of image graphs; a depth first search; computing the number of connections between the nodes for each image graph in the collection of image graphs to the number of connection nodes in the search term image graph for at least

first and second ones of the search term image graphs and link ratios for the first and second stored search term image graphs.

Syeda-Mahmood, in the same field of endeavor, teaches transforming into a collection of image graph by the image graph generation process (see fig. 4, numeral 3); producing a collection of image graphs (see fig. 3, 5a); a depth first search (see col. 8, lines 1-26; if no matching basis points are verified, then the next most signification query curve group is tried until no more significant groups are left); computing the number of connections between the nodes for each image graph in the collection of image graphs to the number of connection nodes in the search term image graph for at least first and second ones of the search term image graphs and link ratios for the first and second stored search term image graphs (see col. 8, lines 1-26).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Andersen reference to utilize transformation into image graphs, a depth search, and connection between nodes as suggested by Syeda-Mahmood, to enable a "fast method of localizing handwritten word patterns in handwritten documents without detail text segmentation" and "means for organizing documents in a database that enables fast search and retrieval" (see col. 3, lines 29-39).

Regarding **claim 69**, Andersen discloses all elements as mentioned above in claim 51. Andersen does not disclose configuring to execute a screening process and a searching process.

Syeda-Mahmood, in the same field of endeavor, teaches configuring to execute a screening process and a searching process (see col. 8, lines 1-26; recovering pose parameters by solving the set of linear equation for the matching basis points corresponding to significant hits

and verification is executed and said to succeed if this score is above a suitable chosen threshold).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Andersen reference to utilize a screening and searching as suggested by Syeda-Mahmood, to enable a "fast method of localizing handwritten word patterns in handwritten documents without detail text segmentation" and "means for organizing documents in a database that enables fast search and retrieval" (see col. 3, lines 29-39).

6. **Claims 31, 52** are rejected under 35 U.S.C. 103(a) as being unpatentable over Andersen et al (US 7,240,062 B2) with Syeda-Mahmood (US 5,953,451), and further in view of Loudon et al (US 6,556,712 B1).

Regarding **claim 31**, Andersen with Syeda-Mahmood combination discloses all elements as mentioned above in claim 30. Andersen with Syeda-Mahmood combination does not disclose written and typographical variations of each source language character.

Loudon, in the same field of endeavor, teaches written and typographical variations of each source language character (see fig. 5, numeral 210, col. 11, lines 54-67, col. 12, lines 1-42; dictionary or a lexicon of all the characters based on a sequence of the newly defined radical is formed).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Andersen with Syeda-Mahmood to utilize written and typographical variations as suggested by Loudon, to "improve the accuracy of the HMM techniques used" (see col. 4, lines 1-9) to "achieve better accuracy and speed of recognition of handwritten characters" (see col. 6, lines 1-13).

Regarding **claim 52**, Andersen with Syeda-Mahmood combination discloses all elements as mentioned above in claim 51. Andersen with Syeda-Mahmood combination does not disclose identifying characters associated with the foreign language; and identifying written and typographical variations for each character.

Loudon, in the same field of endeavor, teaches identifying characters associated with the foreign language (see col. 6, lines 14-60); and identifying written and typographical variations for each character (see fig. 5, numeral 210, col. 11, lines 54-67, col. 12, lines 1-42; dictionary or a lexicon of all the characters based on a sequence of the newly defined radical is formed).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Andersen with Syeda-Mahmood to utilize written and typographical variations as suggested by Loudon, to "improve the accuracy of the HMM techniques used" (see col. 4, lines 1-9) to "achieve better accuracy and speed of recognition of handwritten characters" (see col. 6, lines 1-13).

7. **Claims 35-40, 44-48, 61-66, 70-74, 77** are rejected under 35 U.S.C. 103(a) as being unpatentable over Andersen et al (US 7,240,062 B2) with Syeda-Mahmood (US 5,953,451), and further in view of Krtolica (US 5,719,959).

Regarding **claims 35, 37-40**, Andersen with Syeda-Mahmood combination discloses all elements as mentioned above in claim 34. Andersen with Syeda-Mahmood combination does not disclose extracting information concerning the character's link and node connections, storing the skeleton image of character as a data structure having a header and a connectivity network, a Connectivity Array and a Connectivity Key, a given node of the character being a series of integers, each integer being equal to the number of nodes having a given number of connections

between nodes, connected to the given node, and a given plurality of nodes and connections between the given plurality of nodes, the unique Connectivity Key corresponding to a Connectivity Array for each node of the character.

Krtolica, in the same field of endeavor, teaches extracting information concerning the character's link and node connections (see fig. 2, numeral 210, 212, col. 6, lines 36-61), storing the skeleton image of character as a data structure having a header and a connectivity network (see col. 2, lines 66-67, col. 3, lines 1-21, col. 6, lines 36-67), a Connectivity Array and a Connectivity Key (see fig. 2, col. 6, lines 36-61), a given node of the character being a series of integers, each integer being equal to the number of nodes having a given number of connections between nodes, connected to the given node (see fig. 6, 7; col. 6, lines 36-47), and a given plurality of nodes and connections between the given plurality of nodes, the unique Connectivity Key corresponding to a Connectivity Array for each node of the character (see fig. 6, 7; col. 6, lines 36-61).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Andersen with Syeda-Mahmood to utilize a Connectivity Array and a Connectivity Key as suggested by Krtolica, to provide an "adequately robust technique for recognizing optical characters or other patterns as corresponding to one of a known set of patterns" (see col. 2, lines 12-14).

Regarding **claim 36**, Andersen with Syeda-Mahmood combination discloses all elements as mentioned above in claim 33. Andersen with Syeda-Mahmood combination does not disclose reducing the character to a skeleton image; representing the skeleton image of the character in the form of a linked list comprising a plurality of entries and a plurality of pointers between the

entries, organized on the basis of internal structure corresponding to a plurality of nodes, and connections between the plurality of nodes, wherein each of the plurality of entries in the linked list corresponds to one of the plurality of nodes, and each of the pointers between entries corresponds to one of the connections between nodes; and storing the image graph of the character as the representation of the internal structure of the character.

Krtolica, in the same field of endeavor, teaches reducing the character to a skeleton image (see fig. 7); representing the skeleton image of the character in the form of a linked list comprising a plurality of entries and a plurality of pointers between the entries, organized on the basis of internal structure corresponding to a plurality of nodes, and connections between the plurality of nodes, wherein each of the plurality of entries in the linked list corresponds to one of the plurality of nodes, and each of the pointers between entries corresponds to one of the connections between nodes (see fig. 6, fig. 7, col. 6, lines 36-67); and storing the image graph of the character as the representation of the internal structure of the character (see fig. 1, numeral 108, 110, 114).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Andersen with Syeda-Mahmood to utilize a skeleton image and connect nodes to each other as suggested by Krtolica, to provide an "adequately robust technique for recognizing optical characters or other patterns as corresponding to one of a known set of patterns" (see col. 2, lines 12-14).

Regarding **claims 44-48**, Andersen with Syeda-Mahmood combination discloses all elements as mentioned above in claim 43. Andersen with Syeda-Mahmood combination does not disclose a screen by Connectivity Key method and a screen by Connectivity Array method;

the screening by Connectivity Key is conducted to determine the Connectivity Key contained in the header of the imaged graph search term match the Connectivity Key contained in the header of an image graph of the collection of image graphs; if the screening by Connectivity Key is successful, the searching process is activated; comparing the Connectivity Array associated with the search term image graphs with the each Connectivity Array associated with the collection of image graphs; if the screening by Connectivity Array is successful, the searching process is activated.

Krtolica, in the same field of endeavor, teaches a screen by Connectivity Key method and a screen by Connectivity Array method (see fig. 2, numeral 210, 212, 214); the screening by Connectivity Key is conducted to determine the Connectivity Key contained in the header of the imaged graph search term match the Connectivity Key contained in the header of an image graph of the collection of image graphs (see col. 6, lines 36-67); if the screening by Connectivity Key is successful, the searching process is activated (see col. 6, lines 36-67); comparing the Connectivity Array associated with the search term image graphs with the each Connectivity Array associated with the collection of image graphs (see col. 6, lines 36-67); if the screening by Connectivity Array is successful, the searching process is activated (see col. 6, lines 36-67).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Andersen with Syeda-Mahmood to utilize Connectivity Key Array method to screen and match as suggested by Krtolica, to provide an "adequately robust technique for recognizing optical characters or other patterns as corresponding to one of a known set of patterns" (see col. 2, lines 12-14).

Regarding **claims 61-66**, Andersen with Syeda-Mahmood combination discloses all elements as mentioned above in claim 60. Andersen with Syeda-Mahmood combination does not disclose extracting information concerning the character's link and node connections; reducing the character to a skeleton image; representing the skeleton image of the character in the form of a linked list comprising a plurality of entries and a plurality of pointers between the entries, organized on the basis of internal structure corresponding to a plurality of nodes, and connections between the plurality of nodes, wherein each of the plurality of entries in the linked list corresponds to one of the plurality of nodes, and each of the pointers between entries corresponds to one of the connections between nodes; and storing the image graph of the character as the representation of the internal structure of the character; storing the skeleton image of character as a data structure having a header and a connectivity network, Connectivity Array and a Connectivity Key, a given node of the character being a series of integers, each integer being equal to the number of nodes having a given number of connections between nodes, connected to the given node, and a given plurality of nodes and connections between the given plurality of nodes, the unique Connectivity Key corresponding to a Connectivity Array for each node of the character.

Krtolica, in the same field of endeavor, teaches reducing the character to a skeleton image (see fig. 7); representing the skeleton image of the character in the form of a linked list comprising a plurality of entries and a plurality of pointers between the entries, organized on the basis of internal structure corresponding to a plurality of nodes, and connections between the plurality of nodes, wherein each of the plurality of entries in the linked list corresponds to one of the plurality of nodes, and each of the pointers between entries corresponds to one of the

connections between nodes (see fig. 6, fig. 7, col. 6, lines 36-67); and storing the image graph of the character as the representation of the internal structure of the character (see fig. 1, numeral 108, 110, 114); storing the skeleton image of character as a data structure having a header and a connectivity network (see col. 2, lines 66-67, col. 3, lines 1-21, col. 6, lines 36-67), a Connectivity Array and a Connectivity Key (see fig. 2, col. 6, lines 36-61), a given node of the character being a series of integers, each integer being equal to the number of nodes having a given number of connections between nodes, connected to the given node (see fig. 6, 7; col. 6, lines 36-47), and a given plurality of nodes and connections between the given plurality of nodes, the unique Connectivity Key corresponding to a Connectivity Array for each node of the character (see fig. 6, 7; col. 6, lines 36-61).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Andersen with Syeda-Mahmood to utilize a skeleton image and connect nodes to each other incorporating a Connectivity Array and a Connectivity Key as suggested by Krtolica, to provide an "adequately robust technique for recognizing optical characters or other patterns as corresponding to one of a known set of patterns" (see col. 2, lines 12-14).

Regarding **claims 70-74**, Andersen with Syeda-Mahmood combination discloses all elements as mentioned above in claim 68. Andersen with Syeda-Mahmood combination does not disclose a screen by Connectivity Key method and a screen by Connectivity Array method; the screening by Connectivity Key is conducted to determine the Connectivity Key contained in the header of the imaged graph search term match the Connectivity Key contained in the header of an image graph of the collection of image graphs; if the screening by Connectivity Key is successful, the searching process is activated; comparing the Connectivity Array associated with

the search term image graphs with the each Connectivity Array associated with the collection of image graphs; if the screening by Connectivity Array is successful, the searching process is activated.

Krtolica, in the same field of endeavor, teaches a screen by Connectivity Key method and a screen by Connectivity Array method (see fig. 2, numeral 210, 212, 214); the screening by Connectivity Key is conducted to determine the Connectivity Key contained in the header of the imaged graph search term match the Connectivity Key contained in the header of an image graph of the collection of image graphs (see col. 6, lines 36-67); if the screening by Connectivity Key is successful, the searching process is activated (see col. 6, lines 36-67); comparing the Connectivity Array associated with the search term image graphs with the each Connectivity Array associated with the collection of image graphs (see col. 6, lines 36-67); if the screening by Connectivity Array is successful, the searching process is activated (see col. 6, lines 36-67).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Andersen with Syeda-Mahmood to utilize Connectivity Key Array method to screen and match as suggested by Krtolica, to provide an "adequately robust technique for recognizing optical characters or other patterns as corresponding to one of a known set of patterns" (see col. 2, lines 12-14).

Regarding **claim 77**, Andersen with Syeda-Mahmood combination discloses all elements as mentioned above in claim 51. Andersen with Syeda-Mahmood combination as applied in claim 51 does not disclose creating an image of each of the characters contained in the foreign language lexicon; reducing the image of the character to a skeleton image; ordering the plurality of nodes in a first order; reordering the plurality of nodes in a second order, wherein the second

order is the same of all characters having the same number of nodes connected by the same number of connections between nodes in the same manner as the test character; representing the skeleton image of the character on the basis of the internal structure of the character by a descriptor corresponding to a plurality of nodes and connections between the plurality of nodes of the character, wherein the descriptor is a Connectivity Key which unique for a given plurality of nodes and connections between the given plurality of nodes, the unique Connectivity Key corresponding to the second order of the plurality of nodes; and storing the Connectivity Key representation of the internal structure of the character as the descriptor of the character.

Syeda-Mahmood, in the same field of endeavor, teaches creating an image of each of the characters contained in the foreign language lexicon (see col. 5, lines 1-67; generate connected components of dark regions constituting word segments as well as curved from the boundaries of such connected regions).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Andersen with Syeda-Mahmood as applied in claim 51 to utilize a creation of an image from the language lexicon as suggested by Syeda-Mahmood, to enable a "greater ability to deal with handwriting variation", and "means for organizing documents in a database that enables fast search and retrieval" (see col. 3, lines 29-39).

Krtolica, in the same field of endeavor, teaches reducing the image of the character to a skeleton image (see fig. 7); ordering the plurality of nodes in a first order; reordering the plurality of nodes in a second order (see fig. 2, numeral 206-209), wherein the second order is the same of all characters having the same number of nodes connected by the same number of

connections between nodes in the same manner as the test character (see fig. 2, numeral 209); representing the skeleton image of the character on the basis of the internal structure of the character by a descriptor corresponding to a plurality of nodes and connections between the plurality of nodes of the character, wherein the descriptor is a Connectivity Key which unique for a given plurality of nodes and connections between the given plurality of nodes, the unique Connectivity Key corresponding to the second order of the plurality of nodes (see fig. 2, numeral 210, 212, col. 6, lines 36-67); and storing the Connectivity Key representation of the internal structure of the character as the descriptor of the character (see fig. 1, numeral 108, 110, 114).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Andersen with Syeda-Mahmood as applied above to utilize Connectivity Key in connection with a plurality of nodes and connections through the reduction of a character to a skeleton image as suggested by Krtolica, to provide an "adequately robust technique for recognizing optical characters or other patterns as corresponding to one of a known set of patterns" (see col. 2, lines 12-14).

8. **Claims 53, 55** are rejected under 35 U.S.C. 103(a) as being unpatentable over Andersen et al (US 7,240,062 B2) with Syeda-Mahmood (US 5,953,451), and further in view of Appleby (US 2005/0015240 A1).

Regarding **claims 53, 55**, Andersen with Syeda-Mahmood combination discloses all elements as mentioned above in claim 51. Andersen with Syeda-Mahmood combination does not disclose identifying search terms in a domestic language; and interpreting the search term from the domestic language to the foreign language using an interpreter fluent in the foreign

language; supplementing the foreign language lexicon by identifying, in the foreign language all colloquial variations of the search terms in the foreign language.

Appleby, in the same field of endeavor, teaches identifying search terms in a domestic language; and interpreting the search term from the domestic language to the foreign language using an interpreter fluent in the foreign language; supplementing the foreign language lexicon by identifying, in the foreign language all colloquial variations of the search terms in the foreign language (see fig. 3, fig. 21, paragraphs [0051-0054], [0228]-[0232]).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Andersen with Syeda-Mahmood as applied above to utilize a translator as suggested by Appleby, to align "discontinuous sequence of words" and words that are mutually exclusive are considered together or neighbors in representation (see paragraph [0189]).

***Conclusion***

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to EDWARD PARK whose telephone number is (571)270-1576. The examiner can normally be reached on M-F 10:30 - 20:00, (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on (571) 272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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